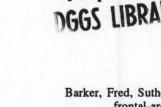
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v. 20, p. 215–218. Table 1. Major mines and production in southeastern Alaska, 1900-1989, by quadrangle

[Mines in order of production. Data as of 1989, from Brew, Drew and others (1991)]

Silver, zinc, gold, lead

Gold, silver, copper, lead

Young, G.M., 1992, Late Proterozoic stratigraphy and the Canada-Australia connection: Geology,

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The long geologic history of southeastern Alaska records many episodes of volcanism of Juneau

Edgecumbe volcano and surrounding volcanic field of Riehle and others, 1989). Silicic plutonic rocks of bodies of batholithic dimensions underlie nearly one-half of southeastern Alaska. They range in age from early Paleozoic to Cenozoic and occur in four main belts, summarized by Brew and Morrell (1983). Many lode deposits are at least spatially related to such bodies (Nokleberg and others, 1987). One unusual belt of plutons forms a narrow (< 25 km (15.5 mi.) wide) zone that extends between tectonostratigraphic terranes along an 800 km (496 mi.) length of southeastern Alaska and British Columbia (Ingram and Hutton, 1994). Small alkalic plutons of Paleozoic and Mesozoic age occur widely through the Alexander Archipelago and contain a variety of resources (MacKevett, 1963; Barker and Mardock, 1988; Ford and others, 1990). Small gabbroid and ultramafic plutons, of early Paleozoic and Cretaceous and Tertiary age, also occur throughout southeastern Alaska. One of the larger examples, the LaPerouse layered gabbro pluton makes up high peaks of the Fairweather Range and locally shows nickel and copper

## MINERAL DEPOSITS

A comprehensive compilation of prospects and mines of southeastern Alaska, past

The report of Brew, Drew, and others (1991) provides an estimate of undiscovered mineral resources of the entire map region and specifically for lands presently open to exploration and development. Their report points to numerous mineral-endowed tracts of a wide variety in southeastern Alaska and suggests a likelihood that mineral discoveries could be forthcoming in further prospecting of this region. Oil, gas, geothermal, and other energy resources, in contrast, seem to have little potential for development in this part of Alaska.

UNDISCOVERED RESOURCES

 Prospect or mine with no known production Mine with known production--Where labeled number and commodity refer to table 1

Rare-earth elements

**EXPLANATION** 

INTRODUCTION

This oblique map illustrates the geographic relation of the many sites of principally gold or gold and silver production (excluding placers principally in the Skagway and Yakutat quadrangles) and of other mines and prospects to the general terrain of southeastern Alaska. Locations of mines and prospects for lode gold and other resources are from the quadrangle maps of Brew, Drew, and others (1991). The following summary of the geology and resources of this area is highly abbreviated from sources cited.

## The geology of southeastern Alaska has been studied since the early 1900s, in early years

principally by the U.S. Geological Survey (see comprehensive review by Buddington and Chapin, 1929). This part of the then Territory of Alaska was only known in crudest of reconnaissance mapping until modern geologic mapping began for large areas of southeastern Alaska in late 1950's by the U.S. Geological Survey (for example; Lathram and others, 1965 and Loney and others, 1975). More detailed work by many investigators soon extended throughout the region and is summarized by Brew, Karl, and others (1991). Southeastern Alaska and adjoining Canada form the northwestern part of North America's lengthy Cordilleran orogenic belt that extends from Alaska through Mexico. Many aspects of the long and complex geological record of southeastern Alaska, from early Paleozoic or older to early Cenozoic time, are shared with the overall Cordilleran belt. Though the geology of this area has been studied for nearly a century, many aspects remain poorly understood and are the subject of ongoing controversy.

Most rocks of Cretaceous age and older are generally believed to have formed by processes associated with the accretion of plates or microplates (also called "tectonostratigraphic terranes") and volcanic arcs of the Pacific Ocean against the west margin of North America by tectonic activity (Monger and others, 1982). Some plates are thought to be of distant origin from across the Pacific or from much farther south by continental-margin parallel displacements. Jones and others (1972) were the first to speculate that parts of insular southeastern Alaska (including lower Paleozoic or older rocks known as the Alexander terrane) were derived from far to the south, near California. The arrangement of continents in the past was probably much different from today's. It has been speculated that in late Proterozoic time East Antarctica was joined to the area of present southwestern United States, and eastern Australia to southeastern Alaska and western Canada (Hoffman, 1991). Young (1992) finds similarities between Upper Proterozoic successions of eastern Australia and northwestern Canada. Another rock unit, termed the Wrangellia terrane, or "Wrangellia," which consists of upper Paleozoic and Triassic volcanic and sedimentary rocks, is speculated to be related to the volcanic-arc terrane of the Permian and Triassic Seven Devils Group of eastern Oregon and Idaho (Vallier, 1977). Wrangellia extends southward from its type area of the Wrangell Mountains in south-central Alaskan to near Haines (Plafker and others, 1989) and then farther south through northern southeastern Alaska (Ford and Brew, 1993) and beyond to the Oueen Charlotte Islands and Vancouver Island (Barker and others, 1989). The various fragments of Wrangellia are thought to record the amalgamation of a volcanic ocean-island plateau or volcanic arc against the west margin of North America. Some evidence indicates that Wrangellia had North America. Other terranes, of more controversial nature, have also been proposed for southeastern Alaska. Monger and others (1982) summarize their view of the record of incorporation of terranes onto North America in western Canadian and southeastern Alaska. The terranes of southeastern Alaska, whatever their source, were amalgamated onto

North America by early Cenozoic time. Processes associated with the latest accretion event, at the end of the Cretaceous, formed volcanic arcs and arc-related basins of sedimentary- and volcanicrock accumulation. Deep below, crustal rocks were melted to form large granitoid batholiths or were transformed into the schist, gneiss, and other metamorphic rocks found widely in the Coast Mountains (Brew and others, 1992) and that are especially well represented near Juneau (Himmelberg and others, 1991). The presence of granite plutons and volcanic units of early or middle Paleozoic age in some areas points to the operation of similar processes through the long geological history of southeastern Alaska. Episodes of mineralization are probably related to these complex tectonic events and especially to volcanism.

greatly varying nature, but effects of later metamorphism greatly obscure many original features of the volcanic rocks. Many of the lode deposits of this area, such as Greens Creek (JU-2, sheet 2), appear to be of volcanogenic origin (Nokleberg and others, 1987; Brew, Drew, and others, 1991). The basaltic, andesitic, and rhyolitic metavolcanic rocks of the Wales Group (Late Proterozoic and Early Cambrian(?) age) on Prince of Wales Island (Gehrels, and Saleeby, 1987) are the oldest known volcanic rocks of southeastern Alaska. Volcanic-arc activity of Early and Middle Ordovician age is recorded by the Descon Formation (Gehrels and Saleeby, 1987). The Freshwater Bay Formation (Loney and others, 1975) of Chichagof Island records bimodal (mafic and felsic) volcanism of Devonian age. Volcanism in the Wrangellia terrane of the Haines area (Davis and Plafker, 1985) and in areas to the south (Loney and others, 1975; Ford and Brew, 1988, 1993 Barker and others, 1989) is related to wide-scale basaltic volcanism in late Paleozoic and Triassic time. Mafic volcanism of Jurassic(?) and Cretaceous age was widespread in a volcanic belt (Gravina belt) that overlaps accreted terranes and extends the length of southeastern Alaska. The overlap volcanic belt includes the Douglas Island Volcanics near Juneau (Ford and Brew, 1988). Volcanism continued through early Cenozoic time, as evident in a large volcanic field of southern Admiralty Island (Lathram and others, 1965) and elsewhere and into late Cenozoic time (Mt.

mineralization (Himmelberg and Loney, 1981). Significant quantities of palladium, along with copper and gold, have been produced from the Salt Chuck Mine in another body of this type (CR-2,

production of mines, and an assessment of undiscovered resources on prospectable lands indicates that an estimated \$2.5 billion of mineral resources, by present dollar values, were produced from this region in the past 100 years (Brew, Drew, and others, 1991). Detailed descriptions and history of mining of the lode deposits are given by Nokleberg and others (1987). Mining districts of southeastern Alaska include the Admiralty, Chichagof, Hyder, Juneau, Ketchikan, Kupreanof, Petersburg, and Yakutat districts (sheet 1, fig. 1). The Juneau, Chichagof, and Hyder districts are particularly well known for many highly productive bodies. The most productive properties from each quadrangle are listed in table 1 and identified on sheet 2. The Quartz Hill molybdenum prospect (KC-3) near Ketchikan has not been mined but is shown because of its unusually large reserves. The Greens Creek Mine (JU-2) is a major deposit that started production of silver, gold, and zinc ores in 1989 but has as of this time ceased production; exploration of the body is continuing. Many prospects and unidentified mines of smaller production are also shown on sheet

Major mineral localities compiled in 1992

Edited by C.L. Ostergren; prepared by L.M. Ghequiere

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Total value all quadrangles <sup>2</sup> Placer deposits not shown.

Juneau

Mount Fairweather

Mount Fairweather

Port Alexander

Port Alexander

Prince Rupert

MF-2 Mount Fairweather

KC-3<sup>4</sup> Ketchikan

Where mines or prospects are in proximity with others, map symbol may indicate clusters of properties. Includes placer production.

<sup>4</sup> No present production. Quartz Hill prospect given due to unusually high reserves of molybdenum [1.5 billion tons; Brew, Drew and others, (1991)].

## OBLIQUE MAPS OF SOUTHEASTERN ALASKA, SHOWING MAJOR MINERAL LOCALITIES

MAJOR MINERAL LOCALITIES

0 10 20 30

VERTICAL EXAGGERATION

HORIZONTAL SCALE IN MILES

X 22.5

VERTICAL SCALE

3,000

HORIZONTAL SCALE IN KILOMETERS

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VERTICAL SCALE

IN METERS

15,000

10,000

Figure 2. Index map of Alaska showing area of map and direction of view.

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